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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/917,732

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Yoshihiro Gunji

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12/22/2003

WENDEROTH, LIND & PONACK, L.L.P.

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WASHINGTON, DC 20006-1021

EXAMINER

MACARTHUR, SYLVIA

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 12/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

File copy

Office Action Summary

Application No.

09/917,732

Applicant(s)

GUNJI ET AL.

Examiner

Sylvia R MacArthur

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-10, 12-16, 25, and 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Zuniga et al (6,146,259).

***Regarding claim 1:*** Zuniga teaches a carrier head 100 (substrate holder body) having a substrate holding side facing the polishing surface and holding a substrate on the substrate holding side; and

A retainer ring 110 that is fixed secured to the substrate holder body, the retainer ring is arranged to surround the outer periphery of the substrate held by the substrate holder body so that the retainer ring engages with the polishing surface (polishing pad 32) radially outside the substrate as the polishing of the substrate is effected; the substrate holder body is provided with a membrane 162 to define a bladder 160.

***Regarding claim 2:*** Figure 4 of Zuniga illustrates that the substrate holder body is in the shape of a dish having a disc-like member and a peripheral ring member (outer clamp ring 206) provided on an outer periphery of the disc-like member on the substrate holding side; the retainer ring is fixed secured to the peripheral ring member; the peripheral ring member and

Art Unit: 1763

retainer ring cooperate to define an inner space; and the membrane 162 is provided in the inner space.

**Regarding claim 3:** The substrate holding apparatus of Zuniga further comprises a membrane support member 114 which is provided in the inner space and connected to the outer periphery of the membrane and a flexible annular seal member 116 (flexure diaphragm) connected between the membrane support member and the peripheral ring member so that the fluid pressure chamber is defined by the membrane, the membrane support member, said flexible annular seal member and substrate holder body.

**Regarding claim 4:** The membrane is provided with one or more holes 292 extending between the inner and outer surfaces of the membrane, see col. 10 lines 21-25.

**Regarding claim 5:** The apparatus by Zuniga further comprises a chucking plate (backing assembly 112) positioned inside and connected to the membrane support member; and the chucking plate has opposite surfaces including an inner surface and an outer surface which is adjacent to the inner surface of the membrane and one or more through holes extending between the opposite surfaces.

**Regarding claims 6 and 30:** The outer surface of the chucking plate is provided with one or more recesses (annular grooves 280) fluidly connected to the through holes.

**Regarding claim 7:** The outer surface of the chucking plate has one or more raised or elevated portions (projections 284) each one having a flat surface; the through hole opens at the flat surface; and the membrane is provided with one or more openings through which said elevated portions of the chucking plate are exposed to a substrate held on the outer surface of the membrane.

Art Unit: 1763

**Regarding claim 8:** The fluid pressure chamber is adapted to be selectively connected to a pressurized fluid source or a vacuum source (localized air jet, illustrated by arrow 298).

**Regarding claim 9:** The retainer ring has an annular face having radially inner and outer edges and to be engaged with the polishing surface; and said annular face is provided with one or more grooves 234 extending from the radially outer edge towards the radially inner edge.

**Regarding claim 10:** Figure 5 of Zuniga illustrates that the grooves reach the radially inner edge, see Fig. 5.

**Regarding claims 12 and 32:** The apparatus of Zuniga further comprises a conduit (fluid line 92b) connecting the through holes of the chucking plate to a vacuum source and a conduit (fluid line 92c) connecting the fluid pressure chamber to a pressurized fluid source (localized air jet illustrated as 298).

**Regarding claims 13 and 15:** Zuniga teaches that the apparatus further comprises one or more pushers (gimbal rod 180) provided on the substrate holder body and arranged to engage with and urge the membrane support member towards the polishing surface.

**Regarding claim 14:** Zuniga teaches a carrier head 100 (substrate holder body) having a substrate holding side facing the polishing surface and holding a substrate on the substrate holding side; and

A retainer ring 110 that is fixed secured to the substrate holder body, the retainer ring is arranged to surround the outer periphery of the substrate held by the substrate holder body so that the retainer ring engages with the polishing surface (polishing pad 32) radially outside the substrate as the polishing of the substrate is effected; the substrate holder body is provided with a membrane 162 to define a bladder 160.

Art Unit: 1763

a substrate support ring (inner clamp ring 204) provided in the inner space and arranged to be sealingly engaged with the substrate to be held by the substrate holding apparatus, and

a flexible seal member (rolling diaphragm 202) is sealingly connected between the substrate support ring and substrate holder body. The flexible seal member and the substrate are engaged with the substrate support ring, the fluid pressure chamber is arranged to selectively connect to a pressurized fluid source or vacuum source.

***Regarding claim 16:*** The apparatus of comprises a first polishing table (platen 30) with a hard polishing surface (Zuniga cites in col.4 line 48 that the pad is a “standard pad” which in col.1 lines 35-40 is a durable roughened surface which reads upon “hard”); and a substrate holding apparatus (carried head 100 features a base 104) a bladder is attached to the base and comprises a membrane 162.

***Regarding claim 25:*** The apparatus comprises a first polishing table with a hard polishing surface; and a substrate holding apparatus; the substrate holding apparatus comprising a substrate holder body having a substrate holding side facing the polishing surface and holding a substrate on the substrate holding side. The flexible seal member and the substrate are engaged with the substrate support ring, the fluid pressure chamber is arranged to selectively connect to a pressurized fluid source or vacuum source. The substrate holding apparatus of Zuniga further comprises a membrane support member 114 which is provided in the inner space and connected to the outer periphery of the membrane and a flexible annular seal member 116 (flexure diaphragm) connected between the membrane support member and the peripheral ring member so that the fluid pressure chamber is defined by the membrane, the membrane support member, said flexible annular seal member and substrate holder body.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 11, 24, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zuniga.

*The teachings of Zuniga were discussed above.*

*Zuniga fails to teach that the grooves end short of the radially inner edge.*

This claim relates to the size of the groove ends. According to *In re Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

The motivation to design the grooves to end short of the radially inner edge is to define the polishing area.

Art Unit: 1763

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to design the grooves to end short of the radially inner edge is to define the polishing area.

5. Claims 17-23,26-29, 31, 33,34, and are rejected under 35 U.S.C. 103(a) as being unpatentable over Zuniga in view of Hirokawa et al (US 6,595,831).

The teachings of Zuniga were discussed above.

**Regarding claims 17 and 26:** Zuniga fails to teach the magnitude of the modulus of compression of the polishing surface.

Hirokawa teaches a polishing tool with an elastic modulus of 100-600 kg/cm<sup>2</sup>.

**Regarding claims 18 and 27:** Zuniga further fails to teach that the hard polishing table is provided with a binder.

Hirokawa teaches a polishing tool with fixed abrasive particles and a binder, see col. 5 lines 20-32.

The motivation to provide a polishing surface with binder is that the binder ensures that the abrasive particles adhere to the polishing surface.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a fixed abrasive polishing surface with a binder.

**Regarding claim 19:** The substrate polishing apparatus of Zuniga comprises a retainer ring 110 fixed secured to substrate holder body on the substrate holding side see col. 7 lines 11-13.

**Regarding claims 20 and 29:** The apparatus of Zuniga fails to teach a second polishing table with a soft polishing surface that is softer than the hard polishing surface.



Art Unit: 1763

Hirokawa teaches

**Regarding claim 21:** The soft polishing surface of Hirokawa has a less modulus of compression than the hard polishing surface.

**Regarding claims 22:** The retainer ring 110 of Zuniga has an annular face having radially inner and outer edges and to be engaged with the polishing surface; and said annular face is provided with one or more grooves 234 extending from the radially outer edge towards the radially inner edge.

**Regarding claims 23 and 31:** Figure 5 of Zuniga illustrates that the grooves reach the radially inner edge.

**Regarding claim 28:** The substrate holding apparatus comprises a retainer ring 110 fixed secured to a substrate holder body (the base 104) on the substrate holding side, the retainer ring is arranged to surround an outer periphery of the substrate held by substrate holder body so the retainer ring engages with the hard polishing surface radially outside the substrate, see col. 7 lines 11-16.

**Regarding claim 33:** Zuniga teaches a substrate holding apparatus for holding a substrate during a polishing operation of the substrate, the substrate holding apparatus comprising a substrate holder body, a retainer ring fixed secured to the substrate holder body; and a flexible membrane having inner and outer surface and arranged inside the retainer ring so that the inner surface cooperates with the substrate holder body to define a fluid chamber therebetween, the outer surface provides a substrate holding surface for holding the substrate; wherein the substrate held by the substrate holding surface is urged against a polishing surface by a fluid pressure supplied into the fluid chamber.

Art Unit: 1763

**Regarding claim 34:** Zuniga further teaches a drive shaft connected to the substrate holder body for rotating the substrate holder body while the substrate is urged against the polishing surface, the drive shaft being operated to urge the retainer ring against the polishing surface through the substrate holder body.

**Regarding claim 36:** Zuniga teaches a substrate holder body holding a substrate; and substrate holder body so that the substrate held by the retaining ring, the retainer ring having an annular surface to be engaged with a polishing surface radially outside the substrate when the substrate is brought into contact with the polishing surface for polishing of the substrate, the annular surface having radially outer and inner peripheral edges and a groove extending from the radially outer peripheral edge towards the radially inner peripheral edge.

6. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zuniga in view of Kimura et al (US 6,432,258)

Zuniga fails to an air cylinder for applying a force to urge the retainer ring against the polishing surface through the substrate holder body.

Kimura teaches a polishing apparatus including an air cylinder 10.

The motivation to provide an air cylinder as Kimura teaches in col. 7 lines 32-67 is control the pressing force of the wafer against the polishing cloth.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Zuniga to include an air cylinder to enhance control of the pressing force of the wafer against the polishing cloth and thus improve the polishing result.

### ***Conclusion***

Art Unit: 1763

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690.

The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Sylvia R MacArthur  
Patent Examiner  
Art Unit 1763

  
December 9, 2003